

PATENT ABSTRACTS OF JAPAN

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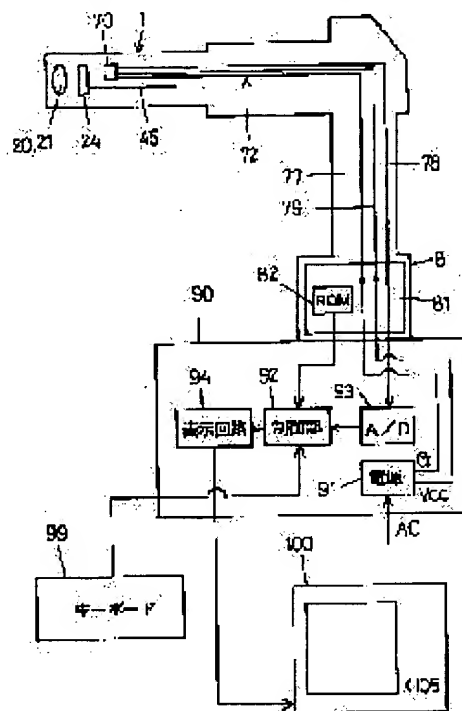
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(54) ELECTRONIC ENDOSCOPE DEVICE FOR MAGNIFIED OBSERVATION OF MINUTE PART

(57)Abstract:

PROBLEM TO BE SOLVED: To enable an operator easily grasp an observation magnification of an endoscope observation image which is displayed on a monitor screen, and surely perform a diagnosis at the time of a magnified observation of a minute part.

SOLUTION: For this electronic endoscope device for magnified observation of a minute part wherein a zooming can be performed by moving at least one part of object optical systems 20, 21 by a remote-control, in the tip end of an insertion part 1, a movement sensor 70 to detect moving states of the object optical systems 20, 21, and observation magnification display means 82, 92, 94 which receive an output signal from the movement sensor 70, convert it into an observation magnification for an endoscope observation image being displayed on a television monitor 100 and display it on the television monitor 100, are provided.



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CLAIMS

[Claim]

[Claim 1] A solid state image pickup device is arranged in the image formation position of the photographic subject by the object optical system built in at the nose of cam of the insertion section. It is the electronic endoscope equipment which transmits the **** signal of the endoscope observation image ****ed by the above-mentioned solid state image pickup device to the above-mentioned insertion outside, and displayed the endoscope observation picture image on the television monitor. In the electronic endoscope equipment for expansion detailed observation which is made to move a part of above-mentioned object optical system [at least] by remote operation, and enabled it to perform zooming The move sensor for detecting the move status of the above-mentioned object optical system in the nose of cam of the above-mentioned insertion section, Electronic endoscope equipment for expansion detailed observation characterized by establishing an observation scale-factor display means to receive the output signal from the above-mentioned move sensor, to change it into the observation scale factor of the endoscope observation picture image displayed on the above-mentioned television monitor, and to display on the above-mentioned television monitor.

[Claim 2] Electronic endoscope equipment for expansion detailed observation of claim 1 publication with which the display scale-factor changeover means for switching the observation scale factor displayed on the above-mentioned television monitor corresponding to the screen size of the television monitor is established.

[Claim 3] The claim 1 in which the observation scale-factor non-display changeover means for an observation scale factor not being displayed on the above-mentioned television monitor is prepared, or electronic endoscope equipment for expansion detailed observation given in two.

[Claim 4] It is the electronic endoscope equipment for expansion detailed observation of claim 1 publication with which the above-mentioned object optical system is interlocked with by zooming, the above-mentioned solid state image pickup device moves, and the above-mentioned move sensor detects the move status of the above-mentioned solid state image pickup device directly.

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DETAILED DESCRIPTION

[Detailed description]

[0001]

[The technical field to which invention belongs] This invention relates to the electronic endoscope equipment for expansion detailed observation which is made to move object optical system and enabled it to perform zooming.

[0002]

[Prior art] Generally a solid state image pickup device is arranged in the image formation position of the photographic subject by the object optical system built in at the nose of cam of the insertion section, the **** signal of the endoscope observation image ****ed by the solid state image pickup device is transmitted to an insertion outside, and an endoscope observation picture image displays an electronic endoscope on a television monitor.

[0003] In observation of the tunica mucosa in a coelome by such endoscope, there are not few cases where he wants to observe the fine structure of the tunica mucosa precisely. Then, by remote operation from the control unit connected with the hand side of the insertion section, a part of object optical system [at least] is moved in the orientation of an optical axis, zooming is performed, and the electronic endoscope equipment for expansion detailed observation to which enabled it to make the scale factor of the endoscope observation image by which image formation is carried out to a solid state image pickup device expand is used.

[0004]

[Object of the Invention] However, since the fine structures of the tunica mucosa differ when the modalities of lesion differ, the suitable scale factor for precision observation of the tunica mucosa is different from each, and the internal organs same in internal organs differing, for example like the stomach and an intestinum crassum cannot judge in many cases for what scale factor it is observing only by seeing the photographic subject image displayed on monitor display, either.

[0005] Therefore, the scale factor was made to expand slowly, changing the comparison observation of the target affected part into the status of the circumference, when performing operation which enlarges an observation scale factor, and it was guessing what scale factor final observation would have. However, since such operation was slow and required time, it had required the burden for the both sides of a way person and a patient.

[0006] Then, a way person can grasp easily the observation scale factor of the endoscope observation picture image displayed on monitor display, and this invention aims at offering the electronic endoscope equipment for expansion detailed observation which can ensure the diagnosis at the time of expansion detailed observation.

[0007]

[The means for solving a technical problem] In order to attain the above-mentioned purpose, the electronic endoscope equipment for expansion detailed observation of this invention A solid state image pickup device is arranged in the image formation position of the photographic subject by the object optical system built in at the nose of cam of the insertion section. It is the electronic endoscope equipment which transmits the **** signal of the endoscope observation image ****ed by the above-mentioned solid state image pickup device to the above-mentioned insertion outside, and displayed the endoscope observation picture image on the television monitor. In the electronic endoscope equipment for expansion detailed observation which is made to move a part of above-mentioned object optical system [at least] by remote operation, and enabled it to perform zooming The move sensor for detecting the move status of the above-mentioned object optical system in the nose of cam of the above-mentioned insertion section, It is characterized by establishing an observation scale-factor display means to receive the output signal from the above-mentioned move sensor, to change it into the observation scale factor of the endoscope observation picture image displayed on the above-mentioned television monitor, and to display on the above-mentioned television monitor.

[0008] In addition, the display scale-factor changeover means for switching the observation scale factor displayed on the above-mentioned television monitor corresponding to the screen size of the television monitor may be established, and the observation scale-factor non-display changeover means for an observation scale factor not being displayed on the above-mentioned television monitor may be established.

[0009] Moreover, the above-mentioned object optical system is interlocked with by zooming, the above-mentioned solid state image pickup device moves, and the above-mentioned move sensor may be made to detect the move status of the above-mentioned solid state image pickup device directly.

[0010]

[Gestalt of the actual condition of invention] The gestalt of enforcement of this invention is explained with reference to a drawing. Drawing 2 shows the electronic endoscope, a control unit 2 is connected with **** of the flexible-tube-like insertion section 1, and the bend 4 formed in a part for the point of the insertion section 1 can make only arbitrary angles crooked in the arbitrary orientation by carrying out rotation operation of the curve operating knob 3 prepared in the control unit 2.

[0011] The point mainframe 10 with which object optical system etc. was built in is connected at the nose of cam of a bend 4. Moreover, in the insertion section 1, near the link section of the insertion section 1 and the control unit 2, the treatment implement insertion opening 5 which is an inlet of the treatment implement **** channel by which **** arrangement was carried out projects, and is arranged in it. 6 is a zoom control lever for operating zooming.

[0012] The connector 8 is connected at the nose of cam of the flexible interconnecting tube 7 connected with the posterior part of a control unit 2, and this connector 8 is connected to the video [light equipment-cum-] processor for performing supply of the lighting light to the light-guide fiber bundle for a lighting, processing of the video signal ****ed by the solid state image pickup device built in the point mainframe 10, etc.

[0013] Drawing 3 is the partial side face cross section of the point mainframe 10. The cover lens 20 which is the 1st lens of object optical system is inserted in the observation port 11, the objective lens group 21, the solid state image pickup device 24, etc. are arranged, and the endoscope observation image image formation is carried out [an image] by a cover lens 20 and the objective lens group 21 is ****ed by the inside by the solid state image pickup device 24. 22 is a YAG laser cut-off filter, and 23 is cover glass.

[0014] The fixed container liner 28 carries out a direct fitting to the hole formed in the orientation of an axis at the point mainframe 10 by the backside to the fixed sheath 27 by which **** fixation was carried out, and it is fixed with the fixed screw 29, and among both 27 and 28, **** fixing of the space ring 30 is carried out, and the fixed opening is secured to the front side among both 27 and 28 covering the overall length except both ends.

[0015] Caulking fixation of the cover lens 20 is carried out in watertight at the nose of cam of the fixed container liner 28, and the front lid 31 is joined to the space ring 30 so that between the side face of a cover lens 20 and the point mainframes 10 may be taken up. 32 is an O ring for seals.

[0016] In the fixed container liner 28, the object frame 34 with which the objective lens group 21 was attached, and television **** 35 in which the solid state image pickup device 24 for ****ing an observation image was attached are mutually ****ed independently free [an attitude] in the orientation of an axis. 33 is an O ring.

[0017] The objective lens group 21 is attached in the lens cylinder 36, caulking fixation is carried out, and the lens frame 36 is joined to the object frame 34. However, you may fix the lens frame 36 with screws to the object frame 34.

[0018] 37 is a shading mask for cutting an unnecessary ambient light. Luminosity drawing is arranged in the front-of-solvent side of the objective lens group 21. Between the object frame 34 and television **** 35, the 1st compression spring 47 energized in the orientation which keeps both 34 and 35 away is ****ed, and it is prevented with backlash.

[0019] The solid state image pickup device 24 fixes at the nose of cam of the flexible substrates 44, such as TAB (tape automation **** bonding) substrate, cover glass 23 is joined by the front-of-solvent side of a solid state image pickup device 24, and the YAG cut-off filter 22 is joined by the front-of-solvent side of cover glass 23.

[0020] The buffer substrate 43 by which the electronic parts which constitute the drive circuit of a solid state image pickup device 24 etc. were carried in the flexible substrate 44 is arranged, and the signal cable 45 is pulled out by the back.

[0021] In the periphery side of cover glass 23, the solid state image pickup device 24, and the flexible substrate 44, the thin insulating tape 38 of an electric insulation is rolled continuously, and the shield cylinder 40 which consists of a conductive tube-like object is -ed **ed by the outside. The shielding wire of a signal cable 45 is connected to the shield cylinder 40.

[0022] Since the nose of cam of the shield cylinder 40 is situated in the position in the middle of the side face of a solid state image pickup device 24, the outside fraction of an insulating tape 38 is filled up with the epoxy system adhesives 41 of the electric insulation which carried out the degassing from there to the nose of cam position of cover glass 23.

[0023] And the insulating tape 39 is further rolled continuously over the periphery of the shield cylinder 40 from the fraction, and the electric insulation between the shield cylinder 40 and television **** 35 is secured.

[0024] Thus, **** fixation of the shield cylinder 40 by which the solid state image pickup device 24 and the electronic circuitry were held is carried out with the fixed screw 42 thrust into television **** 35. The insulating tape 39 intervenes between the apical surface of the fixed screw 42, and the periphery side of the shield cylinder 40, and the electric insulation between television **** 35 and the shield cylinder 40 is secured.

[0025] The cam cylinder 50 of a cylindrical shape by which the 1st, the 2nd, and 3rd cam grooves 51, 52, and 53 were formed is -ed **ed free [rotation] by the periphery side of the fixed container liner 28 at the circumference of an axis, and the slide cylinder 55 which drives in the position surrounding the cam cylinder 50 with the operation wire 25, and is slid to it in the orientation of an axis is arranged.

[0026] The hole ****ed by the slide cylinder 55 lets the nose of cam of the operation wire 25 pass, and the ring 57 fixes stop escaping at the nose of cam. In drawing 3, the slide drive of the slide cylinder 55 is carried out rightward by the operation which operates the zoom control lever 6 and leads the operation wire 25 from a control unit 2 side.

[0027] And if the operation wire 25 is moved to an opposite direction (namely, front), in drawing 3, the slide drive of the slide cylinder 55 will be carried out by the energization force of the 2nd compression spring 58 which surrounds the periphery of the fixed container liner 28 and has been arranged at a left. In addition, the energization force of the 2nd compression spring 58 is usually set up in the observation status more strongly than the energization force of the 1st compression spring 47.

[0028] 62 and 63 are the guidance spools of the dual structure which guides the operation wire 25 into the insertion section 1, the flexible tube 62 consists [the inside], an outside consists of a rectangular adhesion volume coil pipe 63, and adhesion fixation of the cross-section configuration is carried out at the connection pipe 61 by which soldering fixation was carried out at the fixed sheath 27. The flexible tube 62 has the function to prevent that the lubricant applied to the various built-in objects in the insertion section 1 invades.

[0029] The 1st pin 65 which a nose of cam ****s free [a move] without backlash thrusts into the status project towards the inner direction, and is being fixed to the 1st cam groove 51 formed in the cam cylinder 50 by the slide cylinder 55.

[0030] Moreover, it is being thrust and fixed to the status that the 2nd pin 66 which a head ****s projects towards the method of outside in the 2nd cam groove 52 by the object frame 34, and the 3rd pin 67 which a head ****s to the 3rd cam groove 53 thrusts into the status project towards the method of outside, and is being fixed to television **** 35. The tool attachment slots 66a and 67a of the 2nd pin 66 and the 3rd pin 67 are formed by each in the shape of **** radii.

[0031] The rectilinear-propagation slots 68 and 69 through which the 2nd pin 66 and 3rd pin 67 pass in the fixed container liner 28 are formed in the axis and the parallel direction. A head ****s the 2nd pin 66 and 3rd pin 67 to the 2nd cam groove 52 and 3rd cam groove 53.

[0032] Drawing 4 is the development showing the **** status with the 1st, the 3rd cam groove 51, 52, and 53 and the 1st, or 3rd pin 65, 66, and 67, and each pins 65, 66, and 67 are in the position of the usual observation status shown in drawing 3.

[0033] The rotation drive of the cam cylinder 50 is carried out by **** of this 1st pin 65 that the slide cylinder 55 will resist the energization force of the 2nd coil spring 58, will slide back (it sets to drawing 3 and is a method of the right), and will move with it if the optical-system control lever 6 of a control unit 2 is usually operated from the observation status and the operation wire 25 is led, and the 1st cam groove 51 at the circumference of an axis.

[0034] If the cam cylinder 50 rotates to the circumference of an axis, while the 2nd and 3rd pins 66 and 67 which **** with the 2nd and 3rd cam grooves 52 and 53 formed in the cam cylinder 50 will be moved in the orientation of an axis and the object frame 34 will slide ahead (it sets to drawing 3 and is a left), television **** 35 slides back (it sets to drawing 3 and is a method of the right).

[0035] Consequently, at the time of observation, an angle of visibility usually becomes [an angle of visibility / observation distance] the domain which is 2-4mm at 40 degrees by 120 degrees, and what was the domain which zooming from which the focal distance of the objective lens group 21 including the cover lens 20 changes is performed, for example, is shown in drawing 3 , and whose observation distance is 5-100mm will be in the expansion detailed observation status like a microscope.

[0036] And if the optical-system control lever 6 is stopped in middle arbitrary positions, the object frame 34 and television **** 35 which are driven through the operation wire 25 and the slide cylinder 55 will stop at the mid-position of a moving range, and will usually become the arbitrary scale factors between the observation status and the expansion detailed observation status.

[0037] The posterior-extremity side of television **** 35 is this **ing to the apical surface of the slide pin 71 which fixing arrangement of the move sensor 70 is carried out, and was ****ed towards the front from there by the inner skin of the posterior-extremity section of the fixed container liner 28. 72 is a signal cable by which the signal line for move sensor 70 is ****ed.

[0038] Drawing 5 shows the move sensor 70 fraction, and the slide pin 71 is energized by the compression coil spring 73 towards the front. Therefore, if television **** 35 moves back, a slide pin 71 will be pushed in in the case of the move sensor 70, if television **** 35 moves ahead, a slide pin 71 will be pushed on the compression coil spring 73, it will move ahead, and the status that the apical surface of a slide pin 71 always this **ed to the posterior-extremity side of television **** 35 will be maintained.

[0039] In the move sensor 70, the potentiometer which detects the position of a slide pin 71 is prepared. That is, a grand voltage is given the end of the two electric resistance fields 74 and 75 connected in series through the negative side lead wire 77, and the lead wire for a detection 78 is connected in the interval of both the electric resistance fields 74 and 75.

[0040] And the lead wire for power 79 is connected, for example, 5v supply voltage is given, this electric contact 76 touches the electric resistance field 75 of the direction to which the negative side lead wire 77 is not connected, and the contact position changes to electric contact 76 attached in the slide pin 71 according to a move of a slide pin 71.

[0041] Therefore, if television **** 35 moves and a slide pin 71 carries out a variation rate by zooming, since the voltage of the lead wire for a detection 78 will change in connection with it, the position of television **** 35 is detectable from the voltage.

[0042] And if the position of television **** 35 is known, corresponding to it, the move status of the objective lens group 21 at that time can be known, and a zoom scale factor can be known. However, in the actual conversion, it is easy to carry out the direct conversion of the voltage to an observation zoom scale factor.

[0043] The keyboard by which drawing 1 showed the overall configuration for displaying an observation scale factor in the electronic endoscope equipment for expansion detailed observation of the gestalt of this enforcement, 90 was connected to the video [light equipment-cum-] processor, and 99 was connected to it, and 100 are television monitors.

[0044] The buffer substrate 81 is built in the connector 8 of the electronic endoscope connected to the video [light equipment-cum-] processor 90 free [attachment and detachment], and power is supplied from the power 91 arranged in the video [light equipment-cum-] processor 90 with the lead wire for power 79, and the negative side lead wire 77.

[0045] Moreover, the properties (for example, the information on the electronic endoscope being an electronic endoscope for expansion detailed observation in which zooming is possible, the table for changing into a zoom scale factor the voltage detected with the lead wire for a detection 78, etc.) of the electronic endoscope are stored in ROM (memory only for read-out)82 attached in the buffer substrate 81. And if a connector 8 is connected to the video [light equipment-cum-] processor 90, the information in ROM82 will be read into the control section 92 in the video [light equipment-cum-] processor 90.

[0046] A control section 92 is the so-called microcomputer which used micro ***** etc., and the voltage of the lead wire for a detection 78 is digitized by A/D converter 93, and it is inputted.

[0047] And the voltage value is changed into a zoom scale factor based on the conversion data inputted from ROM82, it is multiplied by the screen size of a television monitor 100 etc., the observation scale factor of the endoscope observation picture image in television monitor 100 screen is computed, and the observation scale-factor data is outputted to a display circuit 94.

[0048] The video signal of the endoscope observation image ****ed by the solid state image pickup device 24 etc. is inputted into a display circuit 94, and the character signal of observation scale-factor data is outputted to a television monitor 100 in the form compounded to it. Consequently, an observation scale factor is displayed in a format which is said to the side of the endoscope observation picture image of a television monitor 100 as "x105" so that it may be illustrated by drawing 1 .

[0049] This observation scale factor is different in proportion to it, if the screen size of a television monitor 100 is different. If it doubles with the monitor configuration at that time from the size selection screen where 14 inches, 17 inches, and -- were displayed and a size is chosen by the input from the keyboard 99 connected to the control section 92 there as shown in drawing 6 , based on the data, an observation scale factor will compute by the control section 92.

[0050] However, a control section 92 reads automatically the screen-size data of a television monitor 100 connected to the video [light equipment-cum-] processor 90, and an observation scale factor may be made to be computed based on it.

[0051] In addition, although it is good for the observation scale-factor display to a television monitor 100 to be always made to be performed by connecting a connector 8 to the video [light equipment-cum-] processor 90, you may enable it to choose whether an observation scale-factor display is performed to a television monitor 100 by inputting a selection signal into a

control section 92 from a keyboard 99 etc.

[0052] In addition, you may use the detection equipment of those other than the potentiometer using the electric resistance field that what is necessary is not to limit this invention to the gestalt of the above-mentioned implementation, and for a certain means just to detect the move status of the objective lens group 21 which an observation scale factor does not necessarily need to detect the position of television **** 35, for example, moves in the case of zooming.

[0053]

[Effect of the invention] In the endoscope which can perform expansion detailed observation by zooming according to this invention By having displayed the observation scale factor of an endoscope observation picture image on monitor display Since a problem does not arise at all in grasp of a scale factor even if a way person can grasp the occasional observation scale factor easily on real time, can ensure the diagnosis at the time of expansion detailed observation and changes magnifying power into a proper scale factor at a stretch Since check time is shortened, and the burden of the both sides of a way person and a patient is mitigated and an observation scale factor is displayed on monitor display, an observation scale factor can be grasped very easily in a gloomy endoscope laboratory.

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TECHNICAL FIELD

[The technical field to which invention belongs] This invention relates to the electronic endoscope equipment for expansion detailed observation which is made to move object optical system and enabled it to perform zooming.

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PRIOR ART

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[0003] In observation of the tunica mucosa in a coelome by such endoscope, there are not few cases where he wants to observe the fine structure of the tunica mucosa precisely. Then, by remote operation from the control unit connected with the hand side of the insertion section, a part of object optical system [at least] is moved in the orientation of an optical axis, zooming is performed, and the electronic endoscope equipment for expansion detailed observation to which enabled it to make the scale factor of the endoscope observation image by which image formation is carried out to a solid state image pickup device expand is used.

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EFFECT OF THE INVENTION

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TECHNICAL PROBLEM

[Object of the Invention] However, since the fine structures of the tunica mucosa differ when the modalities of lesion differ, the suitable scale factor for precision observation of the tunica mucosa is different from each, and the internal organs same in internal organs differing, for example like the stomach and an intestinum crassum cannot judge in many cases for what scale factor it is observing only by seeing the photographic subject image displayed on monitor display, either.

[0005] Therefore, the scale factor was made to expand slowly, changing the comparison observation of the target affected part into the status of the circumference, when performing operation which enlarges an observation scale factor, and it was guessing what scale factor final observation would have. However, since such operation was slow and required time, it had required the burden for the both sides of a way person and a patient.

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MEANS

[The means for solving a technical problem] In order to attain the above-mentioned purpose, the electronic endoscope equipment for expansion detailed observation of this invention A solid state image pickup device is arranged in the image formation position of the photographic subject by the object optical system built in at the nose of cam of the insertion section. It is the electronic endoscope equipment which transmits the **** signal of the endoscope observation image ****ed by the above-mentioned solid state image pickup device to the above-mentioned insertion outside, and displayed the endoscope observation picture image on the television monitor. In the electronic endoscope equipment for expansion detailed observation which is made to move a part of above-mentioned object optical system [at least] by remote operation, and enabled it to perform zooming The move sensor for detecting the move status of the above-mentioned object optical system in the nose of cam of the above-mentioned insertion section, It is characterized by establishing an observation scale-factor display means to receive the output signal from the above-mentioned move sensor, to change it into the observation scale factor of the endoscope observation picture image displayed on the above-mentioned television monitor, and to display on the above-mentioned television monitor.

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[0009] Moreover, the above-mentioned object optical system is interlocked with by zooming, the above-mentioned solid state image pickup device moves, and the above-mentioned move sensor may be made to detect the move status of the above-mentioned solid state image pickup device directly.

[0010]

[Gestalt of the actual condition of invention] The gestalt of enforcement of this invention is explained with reference to a drawing. Drawing 2 shows the electronic endoscope, a control unit 2 is connected with **** of the flexible-tube-like insertion section 1, and the bend 4 formed in a part for the point of the insertion section 1 can make only arbitrary angles crooked in the arbitrary orientation by carrying out rotation operation of the curve operating knob 3 prepared in the control unit 2.

[0011] The point mainframe 10 with which object optical system etc. was built in is connected at the nose of cam of a bend 4. Moreover, in the insertion section 1, near the link section of the insertion section 1 and the control unit 2, the treatment implement insertion opening 5 which is an inlet of the treatment implement **** channel by which **** arrangement was carried out projects, and is arranged in it. 6 is a zoom control lever for operating zooming.

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[0013] Drawing 3 is the partial side face cross section of the point mainframe 10. The cover lens 20 which is the 1st lens of object optical system is inserted in the observation port 11, the objective lens group 21, the solid state image pickup device 24, etc. are arranged, and the endoscope observation image image formation is carried out [an image] by a cover lens 20 and the objective lens group 21 is ****ed by the inside by the solid state image pickup device 24. 22 is a YAG laser cut-off filter, and 23 is cover glass.

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[0015] Caulking fixation of the cover lens 20 is carried out in watertight at the nose of cam of the fixed container liner 28, and the front lid 31 is joined to the space ring 30 so that between the side face of a cover lens 20 and the point mainframes 10 may be taken up. 32 is an O ring for seals.

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[0019] The solid state image pickup device 24 fixes at the nose of cam of the flexible substrates 44, such as TAB (tape automation *****) bonding) substrate, cover glass 23 is joined by the front-of-solvent side of a solid state image pickup device 24, and the YAG cut-off filter 22 is joined by the front-of-solvent side of cover glass 23.

[0020] The buffer substrate 43 by which the electronic parts which constitute the drive circuit of a solid state image pickup

device 24 etc. were carried in the flexible substrate 44 is arranged, and the signal cable 45 is pulled out by the back.

[0021] In the periphery side of cover glass 23, the solid state image pickup device 24, and the flexible substrate 44, the thin insulating tape 38 of an electric insulation is rolled continuously, and the shield cylinder 40 which consists of a conductive tube-like object is -ed **ed by the outside. The shielding wire of a signal cable 45 is connected to the shield cylinder 40.

[0022] Since the nose of cam of the shield cylinder 40 is situated in the position in the middle of the side face of a solid state image pickup device 24, the outside fraction of an insulating tape 38 is filled up with the epoxy system adhesives 41 of the electric insulation which carried out the degassing from there to the nose of cam position of cover glass 23.

[0023] And the insulating tape 39 is further rolled continuously over the periphery of the shield cylinder 40 from the fraction, and the electric insulation between the shield cylinder 40 and television **** 35 is secured.

[0024] Thus, **** fixation of the shield cylinder 40 by which the solid state image pickup device 24 and the electronic circuitry were held is carried out with the fixed screw 42 thrust into television **** 35. The insulating tape 39 intervenes between the apical surface of the fixed screw 42, and the periphery side of the shield cylinder 40, and the electric insulation between television **** 35 and the shield cylinder 40 is secured.

[0025] The cam cylinder 50 of a cylindrical shape by which the 1st, the 2nd, and 3rd cam grooves 51, 52, and 53 were formed is -ed **ed free [rotation] by the periphery side of the fixed container liner 28 at the circumference of an axis, and the slide cylinder 55 which drives in the position surrounding the cam cylinder 50 with the operation wire 25, and is slid to it in the orientation of an axis is arranged.

[0026] The hole ****ed by the slide cylinder 55 lets the nose of cam of the operation wire 25 pass, and the ring 57 fixes stop escaping at the nose of cam. In drawing 3, the slide drive of the slide cylinder 55 is carried out rightward by the operation which operates the zoom control lever 6 and leads the operation wire 25 from a control unit 2 side.

[0027] And if the operation wire 25 is moved to an opposite direction (namely, front), in drawing 3, the slide drive of the slide cylinder 55 will be carried out by the energization force of the 2nd compression spring 58 which surrounds the periphery of the fixed container liner 28 and has been arranged at a left. In addition, the energization force of the 2nd compression spring 58 is usually set up in the observation status more strongly than the energization force of the 1st compression spring 47.

[0028] 62 and 63 are the guidance spools of the dual structure which guides the operation wire 25 into the insertion section 1, the flexible tube 62 consists [the inside], an outside consists of a rectangular adhesion volume coil pipe 63, and adhesion fixation of the cross-section configuration is carried out at the connection pipe 61 by which soldering fixation was carried out at the fixed sheath 27. The flexible tube 62 has the function to prevent that the lubricant applied to the various built-in objects in the insertion section 1 invades.

[0029] The 1st pin 65 which a nose of cam ****s free [a move] without backlash thrusts into the status project towards the inner direction, and is being fixed to the 1st cam groove 51 formed in the cam cylinder 50 by the slide cylinder 55.

[0030] Moreover, it is being thrust and fixed to the status that the 2nd pin 66 which a head ****s projects towards the method of outside in the 2nd cam groove 52 by the object frame 34, and the 3rd pin 67 which a head ****s to the 3rd cam groove 53 thrusts into the status project towards the method of outside, and is being fixed to television **** 35. The tool attachment slots 66a and 67a of the 2nd pin 66 and the 3rd pin 67 are formed by each in the shape of **** radii.

[0031] The rectilinear-propagation slots 68 and 69 through which the 2nd pin 66 and 3rd pin 67 pass in the fixed container liner 28 are formed in the axis and the parallel direction. A head ****s the 2nd pin 66 and 3rd pin 67 to the 2nd cam groove 52 and 3rd cam groove 53.

[0032] Drawing 4 is the development showing the **** status with the 1st, the 3rd cam groove 51, 52, and 53 and the 1st, or 3rd pin 65, 66, and 67, and each pins 65, 66, and 67 are in the position of the usual observation status shown in drawing 3.

[0033] The rotation drive of the cam cylinder 50 is carried out by **** of this 1st pin 65 that the slide cylinder 55 will resist the energization force of the 2nd coil spring 58, will slide back (it sets to drawing 3 and is a method of the right), and will move with it if the optical-system control lever 6 of a control unit 2 is usually operated from the observation status and the operation wire 25 is led, and the 1st cam groove 51 at the circumference of an axis.

[0034] If the cam cylinder 50 rotates to the circumference of an axis, while the 2nd and 3rd pins 66 and 67 which **** with the 2nd and 3rd cam grooves 52 and 53 formed in the cam cylinder 50 will be moved in the orientation of an axis and the object frame 34 will slide ahead (it sets to drawing 3 and is a left), television **** 35 slides back (it sets to drawing 3 and is a method of the right).

[0035] Consequently, at the time of observation, an angle of visibility usually becomes [an angle of visibility / observation distance] the domain which is 2-4mm at 40 degrees by 120 degrees, and what was the domain which zooming from which the focal distance of the objective lens group 21 including the cover lens 20 changes is performed, for example, is shown in drawing 3, and whose observation distance is 5-100mm will be in the expansion detailed observation status like a microscope.

[0036] And if the optical-system control lever 6 is stopped in middle arbitrary positions, the object frame 34 and television **** 35 which are driven through the operation wire 25 and the slide cylinder 55 will stop at the mid-position of a moving range, and will usually become the arbitrary scale factors between the observation status and the expansion detailed observation status.

[0037] The posterior-extremity side of television **** 35 is this **ing to the apical surface of the slide pin 71 which fixing arrangement of the move sensor 70 is carried out, and was ****ed towards the front from there by the inner skin of the posterior-extremity section of the fixed container liner 28. 72 is a signal cable by which the signal line for move sensor 70 is ****ed.

[0038] Drawing 5 shows the move sensor 70 fraction, and the slide pin 71 is energized by the compression coil spring 73 towards the front. Therefore, if television **** 35 moves back, a slide pin 71 will be pushed in in the case of the move sensor 70, if television **** 35 moves ahead, a slide pin 71 will be pushed on the compression coil spring 73, it will move ahead, and the status that the apical surface of a slide pin 71 always this **ed to the posterior-extremity side of television **** 35 will be maintained.

[0039] In the move sensor 70, the potentiometer which detects the position of a slide pin 71 is prepared. That is, a grand voltage is given the end of the two electric resistance fields 74 and 75 connected in series through the negative side lead wire

77, and the lead wire for a detection 78 is connected in the interval of both the electric resistance fields 74 and 75.

[0040] And the lead wire for power 79 is connected, for example, 5v supply voltage is given, this electric contact 76 touches the electric resistance field 75 of the direction to which the negative side lead wire 77 is not connected, and the contact position changes to electric contact 76 attached in the slide pin 71 according to a move of a slide pin 71.

[0041] Therefore, if television **** 35 moves and a slide pin 71 carries out a variation rate by zooming, since the voltage of the lead wire for a detection 78 will change in connection with it, the position of television **** 35 is detectable from the voltage.

[0042] And if the position of television **** 35 is known, corresponding to it, the move status of the objective lens group 21 at that time can be known, and a zoom scale factor can be known. However, in the actual conversion, it is easy to carry out the direct conversion of the voltage to an observation zoom scale factor.

[0043] The keyboard by which drawing 1 showed the overall configuration for displaying an observation scale factor in the electronic endoscope equipment for expansion detailed observation of the gestalt of this enforcement, 90 was connected to the video [light equipment-cum-] processor, and 99 was connected to it, and 100 are television monitors.

[0044] The buffer substrate 81 is built in the connector 8 of the electronic endoscope connected to the video [light equipment-cum-] processor 90 free [attachment and detachment], and power is supplied from the power 91 arranged in the video [light equipment-cum-] processor 90 with the lead wire for power 79, and the negative side lead wire 77.

[0045] Moreover, the properties (for example, the information on the electronic endoscope being an electronic endoscope for expansion detailed observation in which zooming is possible, the table for changing into a zoom scale factor the voltage detected with the lead wire for a detection 78, etc.) of the electronic endoscope are stored in ROM (memory only for read-out)82 attached in the buffer substrate 81. And if a connector 8 is connected to the video [light equipment-cum-] processor 90, the information in ROM82 will be read into the control section 92 in the video [light equipment-cum-] processor 90.

[0046] A control section 92 is the so-called microcomputer which used micro ***** etc., and the voltage of the lead wire for a detection 78 is digitized by A/D converter 93, and it is inputted.

[0047] And the voltage value is changed into a zoom scale factor based on the conversion data inputted from ROM82, it is multiplied by the screen size of a television monitor 100 etc., the observation scale factor of the endoscope observation picture image in television monitor 100 screen is computed, and the observation scale-factor data is outputted to a display circuit 94.

[0048] The video signal of the endoscope observation image ****ed by the solid state image pickup device 24 etc. is inputted into a display circuit 94, and the character signal of observation scale-factor data is outputted to a television monitor 100 in the form compounded to it. Consequently, an observation scale factor is displayed in a format which is said to the side of the endoscope observation picture image of a television monitor 100 as "x105" so that it may be illustrated by drawing 1 .

[0049] This observation scale factor is different in proportion to it, if the screen size of a television monitor 100 is different. If it doubles with the monitor configuration at that time from the size selection screen where 14 inches, 17 inches, and -- were displayed and a size is chosen by the input from the keyboard 99 connected to the control section 92 there as shown in drawing 6 , based on the data, an observation scale factor will compute by the control section 92.

[0050] However, a control section 92 reads automatically the screen-size data of a television monitor 100 connected to the video [light equipment-cum-] processor 90, and an observation scale factor may be made to be computed based on it.

[0051] In addition, although it is good for the observation scale-factor display to a television monitor 100 to be always made to be performed by connecting a connector 8 to the video [light equipment-cum-] processor 90, you may enable it to choose whether an observation scale-factor display is performed to a television monitor 100 by inputting a selection signal into a control section 92 from a keyboard 99 etc.

[0052] In addition, you may use the detection equipment of those other than the potentiometer using the electric resistance field that what is necessary is not to limit this invention to the gestalt of the above-mentioned implementation, and for a certain means just to detect the move status of the objective lens group 21 which an observation scale factor does not necessarily need to detect the position of television **** 35, for example, moves in the case of zooming.

[Translation done.]

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\$11.97 Estimated cost File345
\$0.21 TELNET
\$12.18 Estimated cost this search
\$12.61 Estimated total session cost 0.458 DialUnits
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DESCRIPTION OF DRAWINGS

[An easy explanation of a drawing]

[Drawing 1] It is the block diagram which ****s the configuration for [whole] the observation scale-factor display in the electronic endoscope equipment for expansion detailed observation of the gestalt of enforcement of this invention.

[Drawing 2] It is the side elevation of the electronic endoscope of the gestalt of enforcement of this invention.

[Drawing 3] It is the partial side face cross section at the nose of cam of the insertion section of the electronic endoscope of the gestalt enforcement of this invention.

[Drawing 4] It is the development of the cam cylinder of the gestalt of enforcement of this invention.

[Drawing 5] It is the sketch of the move sensor of the gestalt of enforcement of this invention.

[Drawing 6] It is the sketch of the television monitor screen of the gestalt of enforcement of this invention.

[An explanation of a sign]

1 Insertion Section

20 Cover Lens

21 Objective Lens Group

24 Solid State Image Pickup Device

70 Move Sensor

71 Slide Pin

74, 75, 76 Potentiometer

78 Lead Wire for Detection

82 ROM

92 Control Section

100 Television Monitor

[Translation done.]

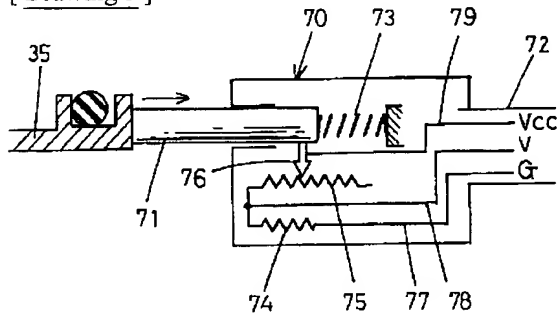
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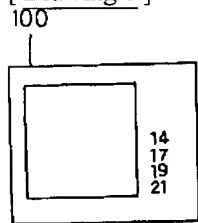
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DRAWINGS

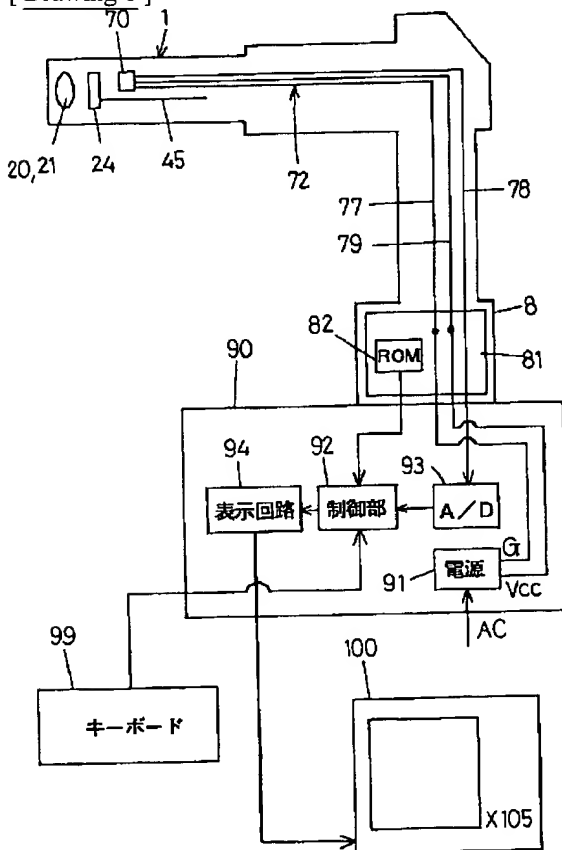
[Drawing 5]



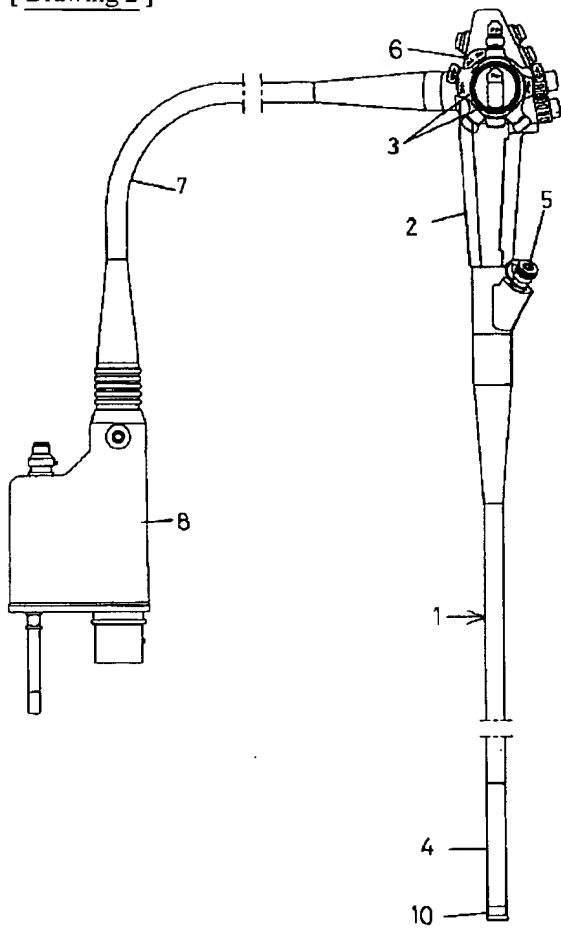
[Drawing 6]



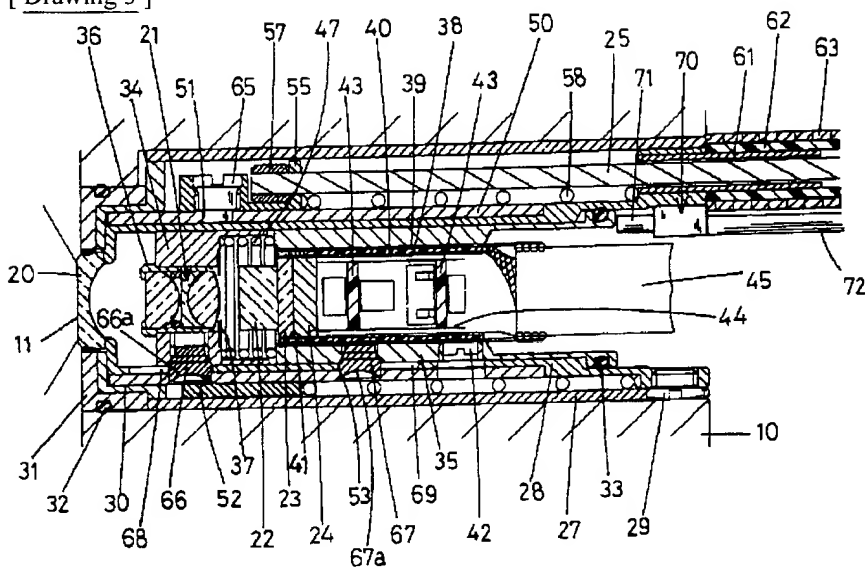
[Drawing 1]



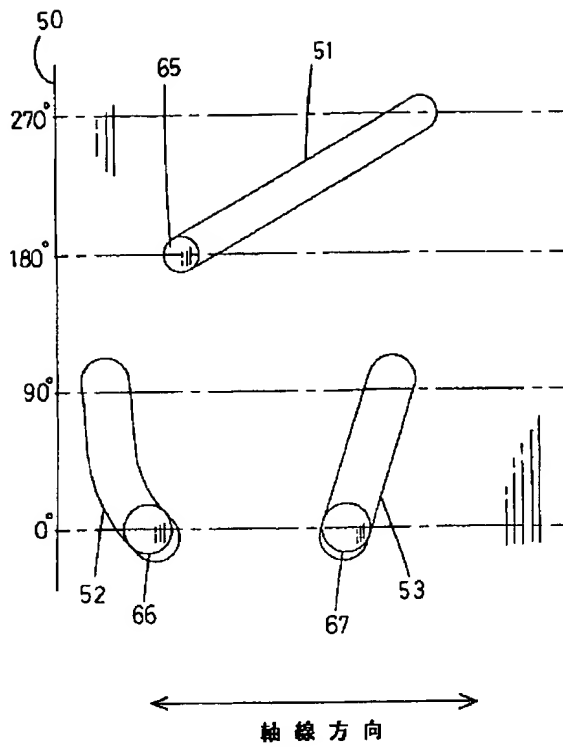
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]